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ABSTRACT

This investigation sought to determine the relationship, in fifth grade children, between semantic divergent thinking and different types of risk taking. Also studied was the pattern of relationships between types of risk taking behavior and the variables of: (1) types of divergent thinking, (2) need for achievement, (3) sex, and (4) IQ. The subjects were 147 fifth graders from two schools within a middle-class community. Obvious, remote and flexible divergent thinking were measured by three tests selected from Guilford's battery. The risk taking situations involved a game of chance and an academic task. Obvious divergent thinking correlated significantly and positively with academic risk taking, while remote and flexible divergency correlated with it significantly and negatively. With academic risk taking as the dependent variable, IQ accounted for 13% of the variance. There were no statistically significant relationships between any of the variables studied and risk taking in a game of chance. The findings add additional support to Guilford's research in that they suggest that semantic divergency is not one-dimensional. It is composed of obvious, remote, and flexible factors. (Author)

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Final Report

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A STUDY OF THE RELATIONSHIP BETWEEN SEMANTIC DIVERGENT THINKING AND TYPES OF RISK TAKING BEHAVIOR IN FIFTH GRADE CHILDREN

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June, 1972

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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Author's Abstract

The purpose of this investigation was to determine the relationship, in fifth grade children, between semantic divergent thinking and different types of risk taking. Also studied was the pattern of relationships between types of risk taking behavior and the variables of: (1) types of divergent thinking, (2) need for achievement, (3) sex, and (4) IQ.

The subjects were 147 fifth graders from two schools within a middle-class community. Obvious, remote and flexible divergent thinking were measured by three tests selected from Guilford's battery. The risk taking situations involved a game of chance and an academic task.

Obvious divergent thinking correlated significantly and positively with academic risk taking while remote and flexible divergency correlated with it significantly and negatively. With academic risk taking as the dependent variable, IQ accounted for 13 percent of the variance. There were no statistically significant relationships between any of the variables studied and risk taking in a game of chance.

The findings add additional support to Guilford's research in that they suggest that semantic divergency is not one-dimensional. It is composed of obvious, remote, and flexible factors. Each type of divergent thinker is unique. Only by examining them separately will accurate pictures of each type be developed.

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CHAPTER I

NATURE OF THE PROBLEM

Introduction[1]

Guilford (1950) stirred the psychological and educational communities by drawing their attention to the appalling neglect of the study of creativity. He pointed out that although there was general recognition by industry and government of the importance of gaining familiarity with the creative disposition; nevertheless an insignificant amount of research had been completed in the twenty-three years prior to 1950.

The identification, analysis, and development of divergent thinking, an important component of creativity, is vital to both society in general and to the individual in particular. Torrance (1962) has stated: "It takes little imagination to recognize that the future of our civilization--our very survival--depends upon the quality of the creative imagination of our next generation [p. 6]." He also pointed out that the stifling of creativity, on a personal level, can cause dissatisfaction in living and ultimately even tension and breakdown [p. 2]. Thus, it behooves educators to learn all they can about the divergent and creative thinker, and

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[1]The Publication Manual of the American Psychological Association, 1967 Revision (Washington, D. C.: The Association, 1969) will serve as the style source in this dissertation.

to evolve meaningful and effective teaching methods to help develop this type of individual. The present investigation is an outgrowth of this need to identify, analyze, and develop divergent thinking.

A number of studies have researched the creative personality which, through the use of biographical inventories, assessments, and personality tests, have found interrelationships between divergency and risk taking traits. Undertaking, on the other hand, an empirical investigation of the relationship between divergency and risk taking is also important in order to delve more deeply into this one prominent characteristic reported frequently in the personalities of creative individuals, for it is especially the attribute of risk taking which sets them apart from others. It is this quality in their personalities that impels them to chance the stigma of failure in the hope of completing a new achievement. It is this force which has enabled many great men to make significant and innovative contributions to society. If there is, then, a significant relationship between divergency and actual risk taking on given tasks, it will be incumbent upon the teaching community to structure learning activities in such a way as to capitalize on this relationship.

The present study has undertaken an empirical investigation into the relationship between semantic divergency and risk taking behavior. Only two known studies have empirically tested this relationship with children as subjects. While the present investigation was planned with the first study in mind and prior to knowledge of the second, a discussion of both studies is relevant to the problem. In the first study, Pankove

(1967) hypothesized a positive correlation between creativity and risk taking and that any motivational disturbance (test anxiety and/or defensiveness) would attenuate this relationship. She measured risk taking with a single type of task--games of skill. Three different games were used, but in her discussion it was noted that only shuffleboard provided the most accurate measure of risk taking. Her measures of creativity (Alternate Uses and Pattern Meanings--taken from the battery used by Wallach and Kogan, 1965a) were scored by summing up the number of different responses. No attempt was made to score for uniqueness. Her final results showed a positive relationship between risk taking and creativity for boys only. However, it appears that Pankove's findings were directly related to her methodology. On one measure of creativity, Pattern Meanings, she found no sex differences between the two groups, but she did find a significant difference on another measure, Alternate Uses--boys generated more responses than girls. Pankove interpreted this to mean that this indicated a higher level of creativity among boys, but it is suggested that her interpretation could have been faulty since only the number of different responses was recorded, while no differentiation was made as to the relative uniqueness of the answers. It is also possible that Pankove's measures of risk taking were more advantageous to the boys in the sample than to the girls. She found, for instance, that boys were greater risk takers in the shuffleboard game (the measure found to be most accurate). This may be accounted for by the fact that the task demanded a motor skill to which the boys may have been more accustomed and thus less

afraid to take greater risks--thereby injecting a cultural bias in favor of the boys. There was, furthermore, no way of telling if anyone was actually taking a number of risks, since no provision had been made to account for individual skill. Thus, a subject who was skillful from the beginning would be willing to take more risks than one who was not. Admittedly, Pankove did state that the boys, in contrast to the girls, seemed to approach the shuffleboard game with greater confidence and boldness [p. 93].

Pankove's study was probably the first with an empirical approach to bridge the gap between creativity and risk taking. The present study is also unique as it is the first to attempt to discover whether there are different degrees of relationships between divergency and different types of risk taking. Also, it has attempted to extend Pankove's work and modify her methodology in several important respects. Here, for example, two different types of risk taking tasks were employed--academic and game of chance. These tasks were designed so that neither had any special sex preference characteristics. The inclusion of an academic risk taking task is especially important for education, since it may aid in discovering whether or not commonly administered objective tests which employ a penalty for guessing may tend to stifle the child's willingness to take risks. The present investigation has also modified Pankove's study in that it measured divergent thinking, not only by scoring for the number of different responses, but also by taking uniqueness of answers into account.

In the second study, Strum (1971) investigated the relationship between creativity and academic risk taking among fifth-graders. She measured risk taking with the aid of a modified version of the Wide Range Vocabulary Test. From it, forty-five items were randomly selected. The children were instructed to choose the number of points they wanted each question to count; and they would gain or lose four, two, or one point, depending upon whether their responses were correct or incorrect. Her risk taking score was based upon only the incorrect answers, since all of them were thought to represent guesses taken. In this study, creativity was measured by Form A of Torrance's figural tests. Strum's final results led to her conclusion that ". . . children who guess and take chances are not necessarily more creative than children who do not exhibit this behavior [p. 40]." Perhaps, here too, the findings are directly related to, and colored by, the methodology used in administering the tests. For example, when asked to assign values to the vocabulary items in the risk taking measure, one can assume that a child would affix the most credit to words he was certain he knew, and the least credit to those he was unsure of. The test must have thereby encouraged a child to take as few risks as possible. The fact that a child gave a wrong answer to a word with a high assigned value would only indicate that the child's knowledge of the word was probably faulty, and would not indicate one way or the other as to whether a greater or lesser risk had been taken. Therefore, the measure used in this study may not have been a true test of risk taking. As for the creativity measure, Torrance's figural test (Form A),

Strum herself questions its use in this study: " . . . there is little empirical evidence to support the assumption that thinking processes described as divergent and creative entered into the production of these pictures [p. 38]." Strum's study, then, might well have been improved had she employed a semantic test of creativity.

In the present investigation, an attempt was also made to extend and modify the efforts expended by Strum as well as those of Pankove. In this study, for example, academic risk taking was measured by the number of times a child guessed on nonsense vocabulary items, when there was a penalty for guessing, since each response to a nonsense item would obviously represent a risk taken. In addition to academic risk taking, risk taking within a game of chance situation was also measured. In her recommendations for further research, Strum (1971) suggested that future investigations should involve the measurement of that type of risk taking that is more relevant to the out-of-school environment [p. 41]. Finally, instead of using a figural measure of creativity as did Strum, the present study used semantic divergence tests which were more appropriate.

One important additional aspect of the present investigation must be noted at this point. This study also goes beyond those of Pankove and Strum in that it attempts to shed more light in a related area which has been fraught with much confusion. The interactive effects of such variables as need for achievement, sex, intelligence, and types of semantic divergent thinking on risk taking behavior create, in turn, a

highly complicated pattern of interrelationships which is little understood. This study, then, has attempted to identify this pattern in the hope that a greater understanding of it may lead to new teaching methods being devised which will accurately account for the magnitude of the respective effects of each of these variables.

The present study has been guided by Guilford's model of the structure of intellect (Guilford, 1967). This model is a three-way (cube-like) classification of intellectual abilities. The three dimensions correspond respectively to the operation, the content, and the product of a given intellectual ability. Thus, each factor within the model is uniquely located and defined in terms of the type of operation employed, the content involved, and the nature of the resultant product. In addition, each factor is considered to be separate from all others. The present investigation, by studying semantic divergent thinking, has focused on one specific operation (divergent thinking) and on one particular content (semantic). The tests chosen to measure semantic divergent thinking result in different end products. Semantic divergent thinking, however, was further divided into three types: obvious, remote, and flexible, for the purpose of assessing or evaluating those end products in three different ways. Referring again to Guilford's structure of intellect, an intellectual ability is defined by its operation (divergent thinking), its content (semantic), and its product, i.e., response (assessed by obvious divergent thinking, remote divergent thinking, and flexible divergent thinking).

In order to acquaint the reader with specific details as to how

this study was conceived, the remainder of this chapter is organized so as to describe the problem studied, the sub-problems which evolved therefrom, the definitions used, and the delimitations under which the results were obtained.

Statement of the Problem

What is the relationship, in fifth grade children, between semantic divergent thinking and different types of risk taking, and how is risk taking affected by selected variables? To analyze this problem, the following sub-problems were delineated.

Sub-problems

Sub-problem 1. What is the relationship between divergent thinking and risk taking in fifth grade children?

Sub-problem 1a. What is the relationship between divergent thinking and risk taking in an academic task?

Sub-problem 1b. What is the relationship between divergent thinking and risk taking in a game of chance?

Sub-problem 2. Is there a greater relationship between divergent thinking and risk taking in a game of chance than in an academic task?

Sub-problem 3. What is the pattern of relationships between types of risk taking behavior and the variables of: types of divergent thinking, need for achievement, sex, and intelligence?

Definitions

A consistent use of the following definitions is employed in this study.

Semantic divergent thinking. This is defined as the production of many varied and unique ideas in verbal form. Three types of divergent thinking were examined: obvious, remote, and flexible. Obvious divergent thinking is defined as the production of a variety of ideas. Remote divergent thinking is defined as the production of unique or clever ideas, and flexible divergent thinking is defined as the production of many categories of ideas appropriate in meaning to a given idea. Throughout the study where divergent thinking is referred to, semantic divergent thinking is meant.

Risk taking in an academic task. This is defined as taking guesses on an objective vocabulary test which includes penalties for guessing.

Risk taking in a game of chance. This is defined as taking a chance on giving up a small gain or a small loss for the hope of a greater gain at the risk of a greater loss.

Delimitations

Certain limitations in this research were imposed. For one thing, this study has been limited to an investigation of fifth grade children. The fifth grade was used because the children can easily follow directions, and because, by this age, the concept of risk taking is probably completely mastered (Kogan & Wallach, 1967, pp. 169-170).

Also, by the fifth grade, they have passed the decline of creativity observed by Torrance (1962, p. 93), occurring at the fourth grade level in American culture. By the fifth and sixth grades, he noted, there is some recovery of creative ability [p. 93]. The fifth-graders studied herein were selected from a middle-class suburban community. All children, however, whose IQ score fell below 84 were excluded since the American Association of Mental Deficiency considers all children whose IQ scores fall more than one standard deviation below the population mean to have sub-average intellectual functioning (Heber, 1961). With the IQ test used, a score lower than 84 was greater than one standard deviation below the mean (The Lorge-Thorndike Examiner's Manual, p. 25). Thus, generalizations regarding the results of this study can be made only with reference to children in a similar socio-economic class, at the same grade level, and to those whose IQ score is 84 or above. The investigation was further limited by the use of only semantic tests of divergent thinking. Therefore, the results are not applicable to other measures of divergent thinking. Semantic tests were chosen for use in this study as they are particularly relevant to the classroom situation wherein verbal examinations are commonly administered.

In this chapter, the nature of the topic investigated is described by stating the problem, the sub-problems, the definitions, and the delimitations. Chapter II presents the theoretical framework, the hypotheses and the relevant related literature. Chapter III contains descriptions of the sample, the instruments, and the procedures used to

conduct this study. The data are presented to the reader in Chapter IV. In Chapter V the findings and additional results are discussed, and, in Chapter VI, a summary of these findings as well as implications and recommendations for further research are presented.

CHAPTER II

THEORETICAL FRAMEWORK, HYPOTHESES, AND RELATED LITERATURE

Theoretical Framework

Biographical inventories, questionnaires and assessment studies of creative adults report them to be self-sufficient, independent, dominant, aggressive and willing to take risks in the hope of greater gains (Roe, 1951a, 1951b; Taylor, 1962; Cattell, 1963; MacKinnon, 1964, 1969; Taylor & Holland, 1964; and Barron, 1969). Creative children who have been given objective personality tests have been found to be quite similar in personality and test-response patterns to creative adults (Weisberg & Springer, 1961; Wallach & Kogan, 1965a; and Kurtzman, 1967). Similarly, studies conducted to investigate the personalities of high risk takers have found them also to be independent, aggressive, and flexible (Kogan & Wallach, 1964; and Cameron & Myers, 1966). Thus, common personality traits have been reported among creative adults and children, and among high risk takers. This raises the important question as to what the empirical relationship between divergent thinking and risk taking may be.

Degrees of risk taking have been shown to be related to different situational contexts (Slovic, 1962; Cartwright, 1968; and Weinstein,

1968). Specifically, investigations of creative individuals have revealed that they are more likely to strive for achievement in situations where they do not have to conform (MacKinnon, 1964, 1969; and Barron, 1969). This suggests that the relationship between divergent thinking and risk taking should be studied within situations which both tend to encourage conforming behavior and those which do not. Typically, the giving of objective tests in school leads to situations where children feel they must conform in order to achieve (Anderson, 1961; and Hallman, 1967). Assume, for example, that a test is administered in which the children are advised that penalties will be assessed for guessing. Here it seems likely that since divergent thinkers normally resist pressures to conform, they will tend to disregard this rule by taking guesses--in the hope of achieving the greater gain of getting the right answers at the risk of receiving a lower grade. This, therefore, suggests the existence of a positive correlation between divergent thinking and risk taking in an academic task.

Traditional teaching is generally carried out in the form of question-answer where it is understood that, out of all the possible responses, there is only one that is correct. Games of chance, on the other hand, present a very different situational context. They are potentially open-ended. They do not normally anticipate that there is only one right way or one correct answer which must be discovered in order to achieve success. Thus, it is suggested that divergent thinkers, possessing a propensity to take risks and feeling no pressure to conform

in a game of chance, will take many risks on this type of task, indicating the existence of a positive correlation between the two variables of divergent thinking and risk taking in a game of chance.

Two additional results may be expected to evolve from the test and game situations. First, the pressure to conform surrounding the academic task will affect divergent thinkers by dampening their tendencies to take risks. The academic task seems to put children in a situation wherein they feel they must follow all the rules to achieve unless they choose not to conform. Second, since the game of chance tends to create an atmosphere relatively free from pressure to conform, it seems logical that in this context divergent thinkers will take more risks than they did on the academic task. In sum, this indicates the existence of a greater positive relationship between divergent thinking and risk taking in a game of chance than in an academic task. In view of the preceding, the hypotheses may now be set forth.

Hypotheses

Hypothesis 1. There will be a positive relationship between divergent thinking and risk taking in fifth grade children.

Hypothesis 1a. There will be a positive relationship between divergent thinking and risk taking in an academic task.

Hypothesis 1b. There will be a positive relationship between divergent thinking and risk taking in a game of chance.

Hypothesis 2. There will be a greater positive relationship between divergent thinking and risk taking in a game of chance than in an academic task.

When Sub-problem 3 was investigated, it was not studied within the framework of a theoretical hypothesis. It was approached in this fashion since no previous research had undertaken to identify the pattern of relationships between types of risk taking behavior and the variables of: (1) types of divergent thinking, (2) need for achievement, (3) sex, (4) intelligence. Rather, some of these variables have been separately studied, but never have they been investigated jointly with respect to their effects on risk taking. Thus, it was decided not to construct a hypothesis for Sub-problem 3, but to examine it without predicting the emergence of any specific pattern.

Related Literature

Many researchers have studied various behavioral elements of the creative personality in an effort to construct a composite description of the creative thinker. They have often used the terms divergent thinking and creativity interchangeably; hence, the relevant literature using both terms is reviewed in the following pages.

In an attempt to further clarify the problem studied, this literature has been divided into the following major topics: (1) divergent thinking and personality, (2) risk taking and personality, (3) situational contexts of risk taking, (4) risk taking: its relation to need for achievement, sex,

and intelligence. These headings were chosen because they cover the literature most relevant to the problem investigated.

Divergent Thinking and Personality

Adults. Many behavioral traits have been correlated with creativity in adults. Roe (1951a, 1951b, 1953, 1960), in her studies of creative scientists, found that they were independent of mind and were quite self-sufficient. MacKinnon (1964, 1969) examined creative architects. He found them also to be relatively independent in thought and action. They saw themselves as more inventive, determined, independent, individualistic, enthusiastic, and industrious than the less creative architects. MacKinnon also found them to be dominant, aggressive, self-confident and self-assured, uninhibited in expressing worries and complaints, free from conventional restraints and inhibitions, unpreoccupied with the impression they made on others, and ready to admit views that were unusual and unconventional. Barron (1969) studied creative adult writers, mathematicians, and architects. In doing so, he observed that: "These are people who stand up and strike out if impelled to do so [p. 68]." In the study undertaken by Taylor (1962), it was also discovered that creative people were willing to take greater and more long-range risks for the hope of greater gains. In general, then, the findings of all of the above researchers as well as those of Cattell (1963) and Taylor and Holland (1964) were substantially in accord. Thus, from the research on these subjects, a picture of the creative adult emerges; he is independent, self-sufficient, dominant, aggressive, adventurous, and will take risks for greater gains.

Children. Getzels and Jackson (1962) studied creative adolescents (grade six through grade twelve) and found that they were not afraid to risk the possibility of error. Weisberg and Springer (1961), who investigated fourth graders, found the high creatives to be more self-confident. Wallach and Kogan (1965a) found that a high creativity-high intelligence group (girls) exhibited the highest level of self-confidence and lack of inhibition. Like results, however, were not found for boys. Kurtzman (1967) investigated ninth graders found to be high in creativity. His results indicated that they were more adventurous than those low in creativity. Although again his findings were significant for the girls only, he asserts they tend to show that the creative individual is a "gambler," a person who prefers to take a chance rather than play it safe [p. 160]. Thus, the picture of the creative adult drawn in the previous section seems to be in conformity with the image of the creative child found in the studies reviewed in this section.

However, as none of the works cited above attempted to directly assess the relationship between divergent thinking and risk taking on actual tasks, the present investigation undertakes empirically to fill this gap. Two studies did attempt to investigate this relationship (with fifth grade children). In one, a significant correlation was found for boys only (Pankove, 1967) and, in the other, no significant results were found (Strum, 1971). As is indicated in the Introduction, the present study differs from previous research in a number of ways: it examined two types of risk taking behavior, neither of which was a motor skill

task; it measured divergent thinking by taking uniqueness into account; and it examined the pattern of relationships between types of risk taking behavior and the variables of: (1) types of divergent thinking, (2) need for achievement, (3) sex, (4) intelligence.

Risk Taking and Personality

Kogan and Wallach (1964) examined impulsiveness, self-sufficiency, independence and rigidity in relation to risk taking. For males, no results were found to be significant. For females, the results were significant and indicated that self-sufficiency and independence were positively correlated with risk taking, and that rigidity and risk taking were negatively correlated. Cameron and Myers (1966) studied personality correlates of risk taking in a game of chance context among male undergraduates. It was found that subjects with strong aggressive and dominant traits tended to take more risks. These two studies indicate that many of the personality correlates of creativity are also the personality correlates of risk taking. Taken as a whole then, the literature reviewed above strongly suggests that there exists a positive correlation between divergent thinking and risk taking.

Situational Contexts of Risk Taking

Slovic (1962) attempted to discover whether or not risk taking was a generalized trait. He reported that the two risk taking tasks, the academic and game of chance situations used in previous experiments, did not positively correlate with each other, and that often they were

negatively correlated. He observed it to be possible that the "willingness to take risks may not be a general trait at all but rather one which varies from situation to situation within the same individual [p. 70]." In another study by Cartwright (1968) the level of risk taking was found to be significantly different for different risk taking tasks, i.e., physical tasks, academic tasks, and games of chance. These results cast doubt on risk taking being a generalized personality variable. Instead, it was felt that the situational characteristics of the specific risk taking measure were an important influence. Weinstein (1968) also found low correlations among different risk preferences, although there was some tendency for subjects to show consistency with tasks sharing similar content. Thus, it seems that risk taking behavior depends, to some extent, upon the nature of the situation.

MacKinnon (1964, 1969) and Barron (1969) found that the creative individual was more strongly motivated to achieve in situations in which independence of action and thought were called for, while less inclined to strive for success in settings where conforming behavior was expected or required. The present investigation, then, endeavored to show the relationship between divergent thinking and risk taking behavior in the above two contrary contexts. To do so, this study employed an academic task (conforming behavior required) and a game of chance (independent behavior encouraged).

Objective tests create conditions where individuals must conform to rules in order to achieve. Anderson (1961), in discussing general

characteristics of most intelligence, ability, and achievement tests, stated: "In these tests the ideal performance is conformity to the examiner's norms, to his standards of excellence, his criteria of desirable or even of usual behavior [p. 124]." Hallman (1967), likewise, called standardized tests a source of pressure to conform. A game of chance, on the other hand, being divorced from the school situation will not tend to encourage conformity in order to succeed. The children enter the game of chance task with little notion of what standards they are expected to meet. It is suggested, therefore, that the two types of risk taking, academic and game of chance, will affect divergent thinkers differently. The divergent thinker is likely to take risks (guesses) on the academic task because he will be willing to risk a lower grade in the hopes of achieving a greater gain--the right answer--as an act of independence and a resistance to conformity. It is also suggested that the divergent thinker, being generally more adventurous and able to function more effectively in situations fostering independent action (Barron, 1969), will also take risks in the game of chance task. It must be realized, however, that the conforming context, the academic task, will somewhat inhibit the divergent thinker, causing him to take fewer risks on this type of task than in the game of chance.

Risk Taking: Its Relation to Need for Achievement, Sex, and Intelligence

Need for achievement. The achievement motive has been found to be an important variable in risk taking. McClelland (1958) found that

children (kindergarten and third graders) high in need for achievement more frequently took moderate risks in a ring toss game, while those low in need for achievement took either high or low risks. Scodel, Ratoosh and Minas (1959) contrasted male college students, found to be high in need for achievement, with Air Force enlisted men, low in need for achievement, on risk taking behavior in a game of chance. The results indicated that the college sample exhibited substantially more conservative behavior than that of the Air Force sample. Atkinson and Litwin (1960) found similar results with male adults, as did Atkinson, Bastian, Earl and Litwin (1960) on a skill task and a game of chance where low monetary incentives were offered.

Other investigators, however, found either contradictory or different results. Rim (1963) reported that men and women high in need for achievement took more risks than those low in need for achievement. These contradictory results may be explained by the fact that Rim's measure of need for achievement was not the same one used in the studies mentioned above. He used an objective ten-item questionnaire instead of the projective test (pictures from the Thematic Apperception Test). DeCharms and Dave (1965) studied fourth, fifth and sixth grade boys by administering an individual motor task on which individual skill was controlled. Degrees of need for achievement were not found to affect risk taking behavior. It is possible that this age group, the control of individual skill, and the isolation of the subjects from spectators accounted for these results. Raynor and Smith (1966), on the other hand,

investigated male college students and found that a strong achievement motive did affect a preference for intermediate risk taking in a game of skill. However, they did not reach the same findings with respect to a game of chance.

Sex. In their study of adults, Wallach and Kogan (1959, 1961) found no over-all sex differences in risk taking behavior. In a later study (1964) they found that women favored moderate risks in a motor skill task but took greater risks than men on tasks involving information-seeking procedures. Kass (1964) studied six, eight, and ten year olds in a gambling situation and found a sex difference--males took greater risks. However, Slovic (1966) found no sex differences in the same age group. It must be noted that Slovic's sample consisted of those children who volunteered at a county fair. This group, then, might have included from the start only those children who were risk takers as evidenced by their act of volunteering for the experiment. These studies are leading works in this field. Kogan and Wallach (1967), in discussing sex differences in risk taking, conclude that so little research has been specifically related to this problem that no generalizations can be made [p. 167]. The necessity to examine the possible influence of sex on the relationship between divergent thinking and risk taking is manifest.

Intelligence. In their study of adults, Kogan and Wallach (1964) reported that the IQ test score itself may be affected by risk taking dispositions [p. 98]. In a later review (1967) they state: "Risk taking

considerations seem to be intertwined in the very core of the verbal intelligence concept [p. 217]." Pankove (1967) specifically studied the effect of intelligence on the relationship between creativity and risk taking in children. For boys, she found that a significant relationship existed between creativity and risk taking when the influence of intelligence was partialled out, while for girls, no significant relationship was found. When she partialled out the effect of creativity and looked at the correlation of intelligence and risk taking, there was also a near-significant relationship between intelligence and risk taking for boys, but, again, not for girls. These results, although not conclusive, indicate the need to examine the nature of the influence of intelligence on the relationship between divergency and risk taking in the present study.

In conclusion, as one can readily appreciate, the above literature relating to need for achievement, sex, and intelligence is contradictory. In an attempt to unravel these tangled threads, the present investigation examined the ways in which these variables affect the major independent and dependent variables.

To sum up at this point, in this chapter the related literature and theoretical framework are juxtaposed with the hypotheses because the hypotheses were an outgrowth of these two former topics. An attempt is also made in Chapter II to highlight the most relevant research. These studies indicate that the creative individual is independent, self-sufficient, dominant, aggressive, adventurous, and that he takes risks for greater gains. They also highlight the fact that many of the correlates of creativity

are also the personality correlates of risk taking, which strongly suggests that there exists a positive correlation between divergent thinking and risk taking. In Chapter III a detailed description is given of the design of this study and of the methods used to conduct it.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

The main purpose of this study was to determine the relationship, in fifth grade children, between divergent thinking and different types of risk taking. Also investigated was the question of how risk taking was affected by selected variables. To accomplish this goal, two types of risk taking behavior--academic and chance--were studied in relation to semantic divergent thinking. In addition, the selected variables of sex, IQ, and need for achievement were studied in order to determine their effects upon risk taking. This chapter describes the methodology for analyses of the data.

Subjects

The subjects of this study consisted of 147 pupils enrolled in seven fifth grade classes in a suburban community. Four classes were housed in one school and three classes in another within this middle-class community. From an original sample of 157 subjects, ten children were eliminated. One child moved before testing was completed, three children did not respond to certain tests, and six scored below 84 on the IQ measure. The remaining subjects had IQ's ranging from a low of 84 to a high of 150. There were 70 girls and 77 boys. Information on IQ scores

obtained for the sample is summarized in Table 1.

TABLE 1

IQ MEANS, STANDARD DEVIATIONS AND RANGE

(N = 147)

	School 1 (N = 85)		School 2 (N = 62)		Total		
	Means	SD	Means	SD	Means	SD	Range
Girls (N=70)	114.78	14.69	114.83	14.52	114.80	14.52	84-150
Boys (N=77)	111.59	16.06	109.88	15.53	110.86	15.26	84-146
Total Sample	113.13	15.41	112.19	15.15	112.73	15.26	84-150

Instruments

The following instruments were employed to collect the necessary data.

Divergent Thinking Measures[2]

Divergent thinking was measured by three semantic group tests taken from Guilford's battery: What Would Happen, Names for Stories, both adapted for children by Merrifield (1960), and Alternate Uses, adapted for children by Christensen, Guilford, Merrifield and Wilson (1969).

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[2]As was stated in the outline presented to the outline committee in December 1970, because of publisher's rules, it is impossible to include samples of the tests used.

What Would Happen (WWH). This is a test that asks the child to try to imagine the consequences of a change in the world. This test contains three parts, each taking 3 minutes to complete. A sample item is: "What would happen if no one needed or wanted sleep?"

Names for Stories (NS). This is a test that asks the child to make up titles for short stories based on nursery rhymes. This test contains three parts, each taking 4 minutes to complete. A sample item is: "There was a man who could not hear his wife talking. She got him a hearing aid. He kept it turned on for a while, but then he decided she talked too much. So he wore his hearing aid, but kept it turned off. Write titles for the story."

Both of these tests (WWH and NS) were scored in two ways. One score measured the total number of varied responses that were directly related to the change or the story (obvious score). Elaborations of an obvious response were grouped together and treated as a single obvious answer. The second score recorded the total number of varied responses that were indirectly or remotely associated with the change or the story (remote score). Elaborations of remote responses were not grouped together. Rather, each elaboration was added to a subject's obvious score. The method for this manner of scoring was obtained from the manual developed for that purpose by Unks and Merrifield (1969). The reliability of these tests has been determined by their administration to 750 fourth, fifth, and sixth grade children (Unks and Merrifield, 1971).

The reliability of the total obvious score for WWH is .60; for NS it is .82. The reliability of the total remote score for WWH is .55; for NS it is .77.

These tests were scored by two raters acting independent of each other. All information about subjects was masked prior to scoring so that the raters knew nothing about the subject whose paper they were judging. The inter-rater reliability for the obvious score on WWH is .83; for NS it is .90. The inter-rater reliability for the remote score on WWH is .84; for NS it is .86.

Alternate Uses (AU). This is a test that asks the child to try to imagine different or varied uses for a common object for the purpose of measuring flexible divergent thinking. It is given in three timed sections (4 minutes each), with each section containing three objects. A sample item is: "Given: A newspaper (used for reading), list as many as six possible uses. If you cannot think of six, go on to the next item."

This test was scored in only one way, so as to obtain a single measure of flexible divergent thinking. Responses different from the common one given in the sample explanation for each object were scored as described in the scoring manual (Sheridan Psychological Services, 1960). The reliability of the total test, based upon use with ninth graders is .85. Considering the closeness in age between the fifth grade sample used here and the norming population, the reliability coefficient here can be expected to be equivalent to that found for the ninth graders.[3] In

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[3]Personal Communication with P. R. Merrifield, December, 1970.

scoring this test, the same procedure was followed as was used for scoring WWH and NS. The present inter-rater reliability is .92.

Risk Taking Measures

Academic task. Since Slakter (1969) has shown that risk taking is a generalized trait on objective examinations specifically, and since he has observed that the particular type of testing situation was not important in the measurement of this generalized trait, this study selected for use an objective group vocabulary test. This test was adapted from a similar test used by Martuza (1970) with ninth grade children. The present investigation employed fifteen of Martuza's nonsense items randomly inserted among 47 legitimate items, the latter items having been randomly selected from the Iowa Tests of Basic Skills, Levels A-F, Form 4, which is used with fifth and sixth graders. A sample nonsense item used in the "vocabulary test" is presented below.

21. nacrous

a) lambent

b) eccritic

c) coggly

d) lutulent

The instructions included these sentences: "If you guess and you are wrong, you will lose more points than if you had left the question blank. If you guess and you are right, you will add to your grade." The risk taking measure was obtained by summing the number of guesses made

on the nonsense items only. As the scoring procedure was purely objective, the investigator was the sole rater of this test.

Game of chance. This task was substantially the same as that used in studies by Myers and Sadler (1960), Katz (1962), Myers and Katz (1962) and Rosenfeld, Copeland, and Suydam (1969). The present investigation used two decks which Katz (1962) labeled the "known payoff deck" and the "narrow-range payoff deck" [p. 541]. The known payoff deck contained 25 cards with -1 written on them, together with 25 randomly inserted cards each possessing a +1 designation. The unknown or narrow-range payoff deck contained 25 cards with integers from -2 to -6 randomly mixed with 25 additional cards having integers from +2 to +6 written on them. Each subject was tested individually and was told to begin by turning over the top card in the known payoff deck. He then was permitted to choose to accept the gain or loss of one poker chip as indicated by that card or to take the top card from the unknown payoff deck. Each subject was given 125 chips to start and was told that he must complete the entire trial. One trial consisted of going through the entire 50 cards in the known payoff deck or continuing until the subject had no chips remaining. The child was told what a trial consisted of and that, at its completion, he would receive candy bars for those chips he won in excess of the 125 given him at the start, so as to provide a substantial inducement for taking risks. Specifically, a child received one candy bar if he ended the trial with a total of 130 chips, and he could win an extra bar for each additional ten chips gained in excess of 130. The risk taking measure was then

obtained by summing up the number of times the child took a card from the unknown payoff deck. As this was an objective scoring procedure, the rating was again done by the investigator.

Need for Achievement Test

The test used consisted of four pictures from the Thematic Apperception Test (TAT), given in a group format. The complete procedure by which it was administered and scored is set forth in the work by McClelland (1953). The four pictures were projected on a screen and the children were then asked to write a story about each in turn within four minutes. The scoring is a modification of the clinical method in that it involves objective criteria rather than the more complex judgment required of a clinical evaluation. The average index of agreement was found to be .91 per cent in the score-rescoring of separate scoring categories. The inter-rater reliability on sixty-one randomly selected subjects in this study is .91.

Intelligence Measure

The Lorge-Thorndike, Level 3, Form A, Verbal Consumable, Group IQ test was administered to the sample. Frank Freeman's review of this test (Buros, 1959, pp. 479-481) notes that it is among the sounder group instruments available. The reliability for the verbal scales of Level 3 is .90. The correlation between the Lorge-Thorndike and the Stanford grade equivalents in reading is .87, while the correlation between IQ and average grade equivalents in arithmetic is .76. The correlations of the

Lorge-Thorndike and two other group intelligence tests, Stanford-Binet and WISC group test, are .60 or higher. As the scoring procedure was objective, the investigator also scored the Lorge-Thorndike tests.

Procedures

Procedures for Testing

The four types of group tests, described above, were administered one week apart in the following order: (1) IQ test, (2) academic task, (3) divergent thinking tests, and (4) the need for achievement measure. The individual game of chance was given at the end of the testing period. This was done so that the informality and apparent lack of academic consequentiality of the task would not affect the children's perceptions of the group tests--which may have occurred had the game of chance been administered prior to the other tests.

Procedure for Analyses of Data

The analyses of the data involved the computation of a matrix of intercorrelations between all pairs of variables. The technique of multiple correlation was used to study the relationships among the variables in this investigation. Stepwise regression analysis was employed to determine the contributions made by the variables upon academic risk taking, and upon risk taking in a game of chance. The .05 level of statistical significance is used.

CHAPTER IV

RESULTS

In Chapter III, the subjects, instruments, and procedures used in this study are described. This chapter presents the findings.

Results of the Examination of the Hypotheses

Hypothesis 1 indicated that there would be a positive relationship between divergent thinking and risk taking in fifth grade children. Two tests of divergent thinking, What Would Happen (WWH) and Names for Stories (NS), were scored for obvious and remote divergent thinking. The two measures of obvious and remote scores were analyzed separately. Table 2 sets forth the intercorrelations between all of the variables used in these analyses.

Hypothesis 1 was divided into two sub-hypotheses. Hypothesis 1a predicted a positive relationship between divergent thinking and risk taking in an academic task. Table 2 shows that there is a statistically significant positive correlation between obvious divergent thinking on the NS test and risk taking in an academic task ($r = .277$), but not for any of the other tests of divergent thinking. Thus, Hypothesis 1a was partially upheld.

TABLE 2

INTERCORRELATIONS OF ALL VARIABLES IN THE ANALYSES

(N = 147)

	2	3	4	5	6	7	8	9	10
1. Sex	.130	.036	-.055	-.126	.020	.031	.127	-.019	.150*
2. IQ		.179*	-.357**	.003	-.199**	.457**	.092	.368**	.510**
3. Need for Achievement			-.004	.133	-.049	.092	-.018	.076	.013
4. Risk taking in an academic task				.045	.175*	-.052	.036	-.174*	-.219**
5. Risk taking in a game of chance					.108	-.089	-.095	-.038	-.014
6. Obvious divergent thinking on NS						-.154*	.277**	-.071	.015
7. Remote divergent thinking on NS							.213**	.330**	.555**
8. Obvious divergent thinking on WWH								.231**	.190**
9. Remote divergent thinking on WWH									.457**
10. Flexible divergent thinking on AU									

** Significant at the .01 level = .19
* Significant at the .05 level = .14

Hypothesis 1b predicted a positive relationship between divergent thinking and risk taking in a game of chance. Reference to Table 2 indicates that there are no statistically significant positive correlations between divergent thinking and risk taking in a game of chance. Thus, Hypothesis 1b was not upheld.

Hypothesis 2 stated that there would be a greater positive relationship between divergent thinking and risk taking in a game of chance than there would be with risk taking in an academic task. Examination of Table 2 reveals that four of the five correlations between divergent thinking and risk taking in a game of chance are negative, while none of the five correlations are statistically significant. In addition, the single measure of divergent thinking that is related to risk taking in a statistically significant and positive manner is in the academic risk taking situation. In view of these findings, which are in a direction opposite to that hypothesized, Hypothesis 2 could not be substantiated.

Finally, this study investigated the pattern of relationships between risk taking behavior and types of divergent thinking, need for achievement, sex, and IQ, as embodied in Sub-problem 3. Two stepwise regression analyses were calculated. The first stepwise analysis was calculated to determine the statistical significance of the contributions made to the multiple correlation by types of divergent thinking, need for achievement, sex, and IQ, when the dependent variable was risk taking in an academic task, while the second stepwise analysis was calculated to determine the statistical significance of the contributions

made by these variables to the prediction of risk taking in a task involving the game of chance situation. The stepwise procedure enters one variable at a time into the regression equation and selects variables from the total correlation matrix which make a statistically significant contribution to the multiple correlation coefficients. The stepwise analysis then partials out that part of the relationship accounted for by the first selected variable and systematically scans the remaining variables for the one which will make the next greatest contribution to the multiple correlation. The process of selecting more variables is continued, and an F-test, applied to the results, indicates whether any of the remaining variables would make a significant contribution to the multiple correlation at the .05 level of confidence.

Reference to Table 3 reveals that IQ was selected as the most important variable in the multiple correlation coefficients when the criterion variable was risk taking in an academic task. The correlation between IQ and academic risk taking was negative and, aside from IQ, no other single variable was found to make any statistically significant contribution to the multiple correlation analysis. Thus, it was discovered that IQ accounted for 13 per cent of the variance of academic risk taking, with the F ratio being highly statistically significant. Remove divergent thinking, as measured by NS, added approximately only 1 per cent more to the variance, and this contribution was not statistically significant. Obvious divergent thinking, as measured by NS, contributed approximately 2 per cent more to the variance, and this also was not a statistically significant contribution. Flexible divergent thinking also accounted

TABLE 3

SUMMARY TABLE ON ACADEMIC RISK TAKING

(DEPENDENT VARIABLE) VS. ALL OTHER VARIABLES

(N = 147)

Step No.	Variable Entered	No. of Independent Variables Included	Multiple R	df	F Ratio
1	IQ	1	.3569	1 & 145	21.1680**
2	Remote divergent thinking on NS	2	.3781	1 & 144	2.6148
3	Obvious divergent thinking on NS	3	.3952	1 & 143	2.2489
4	Flexible divergent thinking on AU	4	.4156	1 & 142	2.8364
5	Need for achievement	5	.4183	1 & 141	.3840
6	Remote divergent thinking on WWH	6	.4203	1 & 140	.2801
7	Obvious divergent thinking on WWH	7	.4209	1 & 139	.0895

**Significant at the .01 level

for only 1 per cent more of the variance. Need for achievement, remote divergent thinking as measured by WWH, and obvious divergent thinking as measured by WWH, also failed to contribute significantly to the multiple correlation coefficients for academic risk taking beyond the variance accounted for by IQ.

The second stepwise regression equation investigated the statistical significance of the contributions of types of divergent thinking, need for achievement, sex, and IQ when the dependent variable was risk taking in a game of chance.

Examination of Table 4 indicates that none of the variables made a statistically significant contribution to the multiple correlation coefficients with risk taking in a game of chance as the dependent variable. Thus, the selected variables of need for achievement, sex, IQ, obvious divergent thinking on NS, obvious divergent thinking on WWH, remote divergent thinking on NS and remote divergent thinking on WWH, and flexible divergent thinking accounted for very little of the variance exhibited by the subjects in the risk taking game of chance situation.

Additional Findings

Further information of interest was derived from this study which was not related to the hypotheses.

Intelligence

Scrutiny of Table 2 reveals that statistically significant correlations were found between IQ and several of the selected variables.

TABLE 4

SUMMARY TABLE ON RISK TAKING IN A GAME OF CHANCE

(DEPENDENT VARIABLE) VS. ALL OTHER VARIABLES

(N = 147)

Step No.	Variable Entered	No. of Independent Variables Included	Multiple R	df	F Ratio
1	Need for Achievement	1	.1334	1 & 145	2.629
2	Sex	2	.1869	1 & 144	2.554
3	Obvious divergent thinking on NS	3	.2207	1 & 143	2.071
4	Obvious divergent thinking on WWH	4	.2482	1 & 142	1.950
5	Remote divergent thinking on NS	5	.2536	1 & 141	.415
6	IQ	6	.2614	1 & 140	.560
7	Flexible divergent thinking on AU	7	.2647	1 & 139	.261
8	Remote divergent thinking on WWH	8	.2665	1 & 138	.141

Positive correlations were found between IQ and remote divergent thinking on both tests (NS: r = .457; WWH: r = .368), flexible divergent thinking (r = .510), and need for achievement (r = .179). Statistically significant negative correlations were found between IQ and obvious divergent thinking as measured by NS (r = -.199) and academic risk taking (r = -.357).

Risk Taking in an Academic Task and in a Game of Chance

There was no statistically significant relationship found between risk taking behavior in the academic task and risk taking behavior in the game of chance.

Sex

A statistically significant positive correlation was found between sex and flexible divergent thinking (r = .150). Females tended to score higher on the flexible divergent thinking measure. No statistically significant correlations were found, however, between sex and either academic risk taking or risk taking in a game of chance.

CHAPTER V

DISCUSSION OF THE RESULTS OF THE EXAMINATION OF THE HYPOTHESES AND ADDITIONAL FINDINGS

The main purpose of this study was to determine the relationship, in fifth grade children, between semantic divergent thinking and different types of risk taking. Also investigated was the pattern of relationships between types of risk taking behavior and the variables of: (1) types of divergent thinking, (2) need for achievement, (3) sex, and (4) IQ. The sample included 70 girls and 77 boys from a middle-class suburban community. This chapter presents a discussion of the results of this research.

Discussion of the Results of the Examination of the Hypotheses

The Relationship Between Divergent Thinking and Risk Taking in an Academic Task

Obvious divergent thinking. The positive correlation between obvious divergent thinking, as measured by Names for Stories (NS), and risk taking behavior in an academic task was statistically significant ($r = .175$), but the relationship between obvious divergent thinking, as measured by What Would Happen (WWH), and risk taking in an aca-

demic task was not. The relationship of these two measures of obvious divergency to each other was also positive and statistically significant ($r = .277$). Yet, somewhat surprisingly, the correlation between obvious divergent thinking on WWH and remote divergent thinking on WWH was similarly positive and statistically significant, and almost as high ($r = .231$). In contrast, the relationship between the obvious and remote divergent thinking scores on NS was negative and statistically significant ($r = -.154$). This may indicate, then, that at this age level NS provides a clearer differentiation between obvious and remote divergent thinking than WWH. Since the above correlations are basically consistent with those found by Merrifield, Gardner and Cox (1964), who administered NS and WWH using 443 seventh graders as their sample, it is suggested that the nature of the tests themselves may have accounted for this discrepancy. For the present sample of fifth graders, it may have been easier to write titles for stories (NS) than it was to think of consequences of a change in the world (WWH). For example, on NS, a child could have initially made titles out of certain key words taken from the story itself and then later have devised unusual titles. Conversely, on WWH there was no way to pick up an obvious answer. Rather, one had to imagine unusual things happening from the outset, as there were no apparent clues to help a child get started. Since there were no upper limits for either test, the cumulative effect of the means, standard deviations, and ranges of the obvious and remote scores give some support for this suggestion (see Appendices A & B). The mean

number of answers given on WWH was 25.5; the mean number of answers given on NS was 32.1 The standard deviation on WWH was 13.2; the standard deviation on NS was 21.8. The range of scores on WWH was 5 to 57; the range of scores on NS was 6 to 89. It appears, then, that scores on NS exhibited greater variability in responses than did those on WWH, which may account for the greater differentiation between remote and obvious scores on the former.

Thus, looking at obvious divergent thinking on the NS measure alone, the relationship found between it and risk taking in an academic task is in the hypothesized direction. Those subjects high in obvious divergent thinking tended to take more risks in an academic task than those low in obvious divergent thinking.

Remote divergent thinking. The relationship between remote divergent thinking, as measured by WWH, and risk taking in an academic task was negative and statistically significant ($r = -.174$), but the correlation between remote divergent thinking, as measured by NS, and risk taking in an academic task was not statistically significant. These results were not predicted. One explanation for this occurrence is that there may be differences in personality characteristics, needs, interests, and temperaments between obvious and remote divergent thinkers, which may account for the risk taking characteristics of the former and the lack thereof in the latter. Merrifield, Gardner and Cox (1964) investigated the relationships between types of semantic divergent thinking and personality measures because it was felt that each type of divergent

thinking may include a composite of certain personality traits. Differences in personality have been found and are discussed below (see page 45).

It is possible, however, that another factor is operating here. It is interesting to note that the relationship between IQ and risk taking in an academic task was negative and statistically significant ($r = -.357$), and the relationships between IQ and both remote scores were positive and statistically significant (NS: $r = .457$; WWH: $r = .368$). As there are such high intercorrelations between IQ and remote divergent thinking, IQ may be confounding the relationships between remote divergent thinking and risk taking in an academic task. The confounding effect of IQ is also discussed in greater detail below (see page 48).

Flexible divergent thinking. The correlation between flexible divergent thinking, as measured by Alternate Uses (AU), and risk taking in an academic task was negative and statistically significant ($r = -.219$). Those subjects who were high in flexible divergent thinking tended to take fewer risks than those subjects who were low in flexible divergency. Here again, personality factors, needs, interests or temperaments may account for the differences in this result from those relating to obvious and remote divergent thinking on NS. This problem is explored in greater detail in the analyses below.

It is also possible that a similar phenomenon occurred here as may have occurred in the relationships between remote divergent thinking and risk taking in an academic task. Since the positive correlation

between flexible divergency and IQ is statistically significant ($r = .510$), it is suggested that IQ may also be a confounding factor in the relationship between flexible divergent thinking and risk taking in an academic task. This possibility is also discussed in detail below.

Analyses of results related to divergent thinking and academic risk taking. The dissimilar relationships found in this study between the types of divergent thinking and academic risk taking may have occurred due to differences in personality characteristics, needs, interests, and temperaments. Such differences do exist when creativity is examined within a context of high and low intelligence. Looking at two previous studies (Getzels & Jackson, 1962; Wallach & Kogan, 1965a) where, unlike this study, IQ was not found to be highly associated with creativity, the importance of IQ is seen. In both of these studies, although creativity was treated as if it were a unitary dimension, it was nevertheless examined in relation to high and low intelligence. Getzels and Jackson (1962) investigated individuals high in creativity but low in IQ, and those high in IQ but low in creativity. Those individuals who were low in both measures, or high in both, were eliminated. Wallach and Kogan (1965a) studied all four groups.

Getzels and Jackson (1962) reported that those subjects high in creativity and low in intelligence tended to favor growth, and they were less inclined to make good grades just for the sake of good grades. Those high in intelligence and low in creative ability, conversely, tended to favor safety and conservativism. Thus, the former subjects

were willing to go off in new directions, whereas the latter tended to focus on making good grades and seeking the socially accepted solution. Wallach and Kogan (1965a) found that those subjects low in both creativity and IQ were somewhat self-confident, whereas those high in both measures were the most self-confident. On the other hand, those low in creativity but high in IQ seemed to be unwilling to take risks. They hesitated to express their opinions and seemed to be extremely afraid of committing an error. Those subjects high in creativity and low in IQ similarly exhibited a lack of self-confidence and tended to perform more effectively when evaluational pressures were absent.

When creativity was looked at as a multidimensional aptitude in terms of types of divergent thinking, as in the present study, a more detailed picture emerged. The present investigation employed three tests of semantic divergent thinking taken from Guilford's battery of tests. These tests were designed to assess factors in his structure of intellect model. In this model, each factor is considered to be unique and independent of all others (Guilford, 1967). Thus, found within the semantic divergent thinking aptitude are the separate and distinct factors of remote, obvious, and flexible divergent thinking. It would seem, then, that divergent thinking cannot be properly examined as a composite score. Merrifield, Guilford, Christensen, and Frick (1961), using adult males, conducted an investigation into the interrelationships between obvious, remote, and flexible divergent thinking and traits of motivation and temperament because they felt that certain non-

aptitude traits were related to the type of divergent thinker. Thus, they felt the need to explore the extent to which measures of divergency could be accounted for in terms of needs, interests, and temperaments. Their results indicated that those subjects who were high in obvious divergent thinking were self-confident and dominant. Those who were high in remote divergency tended to also be self-confident. Flexible divergent thinkers, however, did not tend to have either of these traits.

In a study conducted by Merrifield, et al., (1964), which employed children as subjects and examined divergent thinking as a multidimensional aptitude, different results were found. A statistically significant negative relationship between obvious divergent thinking and IQ was found in seventh graders. No statistically significant correlations were found between obvious divergent thinking and either self-confidence or independence. It was further found that there were statistically significant positive relationships between remote divergent thinking and IQ, self-confidence, and independence, and between flexible divergent thinking and IQ, self-confidence, and independence. Although more research needs to be conducted in this area, each of the above studies suggest that different types of divergent thinkers may have different personality traits, needs, interests, and temperaments which may, in turn, affect their risk taking behavior.

Applying the above results to the findings of the present study, those subjects who were high in obvious divergent thinking on NS, tended to be low in IQ and may, therefore, have been less conservative

and self-confident. They, in this instance, tended to take the most risks on the academic task. It is suggested that these subjects may have taken such risks because, being low in IQ and not feeling confident in their ability to receive good grades, they may have felt it necessary to take risks to compensate for their lack of knowledge. Conversely, those subjects high in remote and flexible divergent thinking tended to be high in IQ; consequently, they may have been self-confident and independent. Nevertheless, they tended to take fewer risks in the academic task. It is suggested, then, that these subjects did not take many risks because, being high in IQ, they may have felt confident with respect to their ability to get good grades, and they may have consequently been satisfied to answer only those questions they were sure they knew. They, therefore, may not have felt the need to take risks to improve their performance either in terms of grades or in the acquisition of knowledge.

As there were high intercorrelations among the variables of IQ, divergent thinking, and academic risk taking, it is suggested that IQ is a confounding factor in the relationships between the divergent thinking measures and risk taking in an academic task. Since there were such high intercorrelations, the amount of variance of academic risk taking which would be predicted solely by the measures of divergency would, in the present study, no longer be significant. Additionally, the relationships of each of the measures of divergent thinking to academic risk taking appear to be associated with the relationships each have with IQ. For example, it must first be remembered that IQ correlated negatively

with academic risk taking and that this correlation was statistically significant. IQ correlated positively, however, with the three measures of remote and flexible divergency, and these correlations were also statistically significant. The measures of remote and flexible divergency, in turn, correlated negatively with academic risk taking, as did IQ, except that only two of these correlations were statistically significant. Thus, there seems to be a trend towards a negative relationship between remote and flexible divergency and risk taking in an academic task as there is between IQ and academic risk taking. A different and interesting pattern occurs when the measures of obvious divergency are examined. IQ correlated negatively with obvious divergent thinking as measured by NS, and this correlation was statistically significant. This measure of obvious divergency, in turn, correlated positively with academic risk taking, and this correlation was also statistically significant. On the other hand, there was no statistically significant correlation between IQ and obvious divergent thinking as measured by WWH, nor was there any statistically significant correlation between this measure of obvious divergency and academic risk taking. Thus, to sum up, the relationships between the measures of divergency and academic risk taking seem to be influenced by their relationships to IQ. If the divergency measures correlate positively with IQ, they tend to correlate negatively with academic risk taking; if they correlate negatively with IQ, they tend to correlate positively with academic risk taking; and, if they have no statistically significant correlation with IQ, they likewise tend to have none with respect to academic risk taking.

The Pattern of Relationships Between Academic Risk Taking and Types of Divergent Thinking, Need for Achievement, Sex, and IQ

The stepwise regression equation revealed that in the present sample the best predictor of risk taking behavior in an academic task is IQ. There was a negative correlation between IQ and academic risk taking and IQ accounted for 13 per cent of the variance. After IQ was selected, no other single variable made a statistically significant contribution. One must therefore look to the other variables, not studied in the present investigation, to account for the remaining variance. Kogan and Wallach (1964) discussed the need to consider personality factors within a motivational pattern as influencing the relationship between risk taking and creativity. Motivational patterns such as fear of failure, history of success and failure, anxiety or defensiveness, for example, may be responsible for portions of this additional variance. Specifically, Pankove (1967) did find that defensiveness influenced the relationship between risk taking and creativity in boys only. Thus, perhaps personality factors influenced by a motivational pattern are also operating here.

The Relationship Between Risk Taking in a Game of Chance, Divergent Thinking, and Other Selected Variables

There were no statistically significant relationships found between any type of divergent thinking and risk taking in a game of chance. In fact, there were no statistically significant correlations found between risk taking in a game of chance and any of the variables

studied. This suggests that those subjects who are considered divergent thinkers, as measured by the tests used, will not take any more or fewer risks in a game of chance than those who are found not to be divergent thinkers.

One may conjecture that these results were derived, in part, from either the nature of the reward given in the game or factors extrinsic to the risk taking task itself. It is possible that with candy, being offered as a reward, the subjects reacted differently than anticipated. They were aware that in order to receive the candy they needed to win at least five chips in addition to those they were given at the start, and they were kept apprised as to how many chips they had at any one time. It may have occurred, then, that as soon as they obtained enough chips to receive a candy bar, they considered the candy bar already won. Thus, even though they could conceivably have lost the extra chips on subsequent draws, their mental set may have been such that they felt the candy was theirs immediately after they won the five extra chips, and regardless of what might occur in the future. Merrifield, et al., (1961) found that risk taking, when defined as risks to personal safety or personal property, had near-zero correlations with scores for obvious, remote, and flexible divergent thinking. Similarly, here the subjects may have felt that as soon as five extra chips were won, the candy was already their personal property which could then be lost. In the present sample, 76 per cent of the subjects won one or more candy bars. Thus, the game may have been heavily affected by the concept that the subjects

felt they were mostly gambling with property that actually belonged to them, rather than with small gains made on the way to winning the game.

Another factor to be considered here is the element of competition. Although the game was administered individually to each subject away from the others in order to eliminate competition, it is possible that it entered as a factor anyway. It was discovered that soon after a subject left the game situation, most of his classmates knew how much candy he had won, if any. It thus became impossible to eliminate the competitive element. This, again, raises the question of the extent of the influence of variables, other than those investigated, upon the risk taking behavior of the subjects. Because of the competitive element, for example, factors such as a need for self-esteem or a fear of failure may have been influencing the number of chances taken.

Additional Findings

The discussion which follows is of additional findings not related to hypotheses. Therefore, cross-validation on a new sample would be needed to accept these results with confidence.

Intelligence

IQ and divergent thinking measures. As is reported earlier, the correlations between the IQ scores and the measures of remote and flexible divergent thinking were positive and statistically significant (NS: $r = .457$; WWH: $r = .368$; AU: $r = .510$). Thus, IQ seems to be associated with those types of semantic divergent thinking which demand originality or a shift in set.

Guilford (1968) also found high positive correlations between IQ and semantic divergent thinking in ninth graders. He felt, furthermore, that a number of the higher intercorrelations may have occurred due to the fact that the divergent thinking tests were not confined to divergent thinking variances. Rather, some of the tests were believed to contain certain variances of other factors that are commonly found in IQ measures [p. 129]. Similarly, in the present study, the tests used to measure remote and flexible divergent thinking must have demanded some verbal facility which is a prime requirement of the IQ test used, i.e., the Lorge-Thorndike, Level 3, Form A, Verbal Consumable (Thorndike, 1963, p. 51).

Verbal facility also plays an important role in the relationships between Iq and the measures of obvious divergency. In the present study, the relationship between obvious divergent thinking, as measured by NS, and the IQ scores was negative and statistically significant, while the relationship between obvious divergent thinking, as measured by WWH, and IQ was not statistically significant. These correlations occurred even though the obvious measures also required some verbal ability, as did those of remote and flexible divergency. These results, however, are similar to those found by Guilford (1968) and Merrifield, et al., (1964). Guilford (1968, p. 135) suggested that one possible explanation for these findings is that the more semantic information we have (a characteristic of obvious divergent thinkers), the poorer we do in a test that requires a fast rate of recall, i.e., IQ tests. It is suspected that this occurs due to interference caused by other items of information similar to the item sought. This suggestion seems to be

supported by the present study.

The fact that the present sample had a wide range of IQ (84-150) may also have accounted, in part, for the correlations found between IQ and remote and flexible divergent thinking. Studies by Meer and Stein (1955) and Green (1957) revealed high correlations between IQ and creativity measures when a wide range of intelligence scores were obtained. Merrifield, et al., (1964) also found high positive correlations between IQ and remote and flexible divergent thinking, using a seventh grade sample with a wide range of IQ. For boys, the relationship between IQ and remote divergent thinking was .31; for girls, it was .44. For boys, the relationship between IQ and flexible divergent thinking was .30; for girls, it was .44. Guilford (1968) also found high correlations between IQ and remote and flexible divergent thinking (.38 and .33, respectively) within a ninth grade sample with IQ scores ranging from 60 to 149. When a narrow range of IQ is examined with respect to creativity, correlations have been found which differ from those of the present study. In research conducted by Getzels and Jackson (1962) low intercorrelations were found between IQ and creativity measures. Their sample included a narrow range of IQ, having a mean of 132. Torrance (1960), in his replications of Getzels' and Jackson's study, found similar correlations. He concluded that a minimum level of IQ is needed in order to obtain an accurate measurement of divergent thinking.

This concept of a threshold level of IQ being needed

before creativity can be operational was also proposed by Guilford (1967). He reported that he found very few individuals who had both low IQ and high divergent thinking scores. He observed that " . . . although high IQ is not a sufficient condition for high divergent production, it is almost a necessary condition [p. 168]." Thus, Guilford (1967) felt that subjects high in IQ could be found at any level of divergent production, and that subjects high in creative ability could be found at any level of IQ. Most often, however, he observed, those who are high in creative ability are usually also above average in IQ.

IQ and risk taking in an academic task. The correlation between IQ and risk taking in an academic task was negative and statistically significant ($r = -.357$). Thus, those subjects who were high in IQ seemed to take fewer risks on the academic task. The nature of the task used here (a vocabulary test with legitimate and nonsense items) may have contributed to this result. Although this test of academic risk taking was designed so as to eliminate skill, it may not have done so successfully for the following reason. As mentioned above, the sample included a wide range of IQ. Those subjects high in IQ, however, tended to do better on the legitimate items than those who were low in IQ. Therefore, it is suggested that the former subjects, being better skilled in the test matter as a whole, may not have felt the need to guess on items they were unsure of, especially the nonsense items. Being higher in IQ, they may have been confident in their ability to

perform well in relation to their peers by answering only those items they were sure they knew. Those low in IQ, on the other hand, were less skilled in vocabulary tests and could only be sure of a few of the legitimate items. Thus, they may have felt the need to guess in the hope of improving their performance. Skill, therefore, was a difficult factor to eliminate.

IQ and need for achievement. The relationship between need for achievement and IQ was a positive one. Although a low correlation ($r = .179$), it was significant at the .05 level. Thus, those subjects who were high in IQ tended to be high in need for achievement. There is some evidence that high need for achievement may be related to tasks which require mental manipulation, problem-solving, or complex arithmetic operations (McClelland, 1961, p. 216). As the IQ test employed in the present study involved such activities, the positive relationship between IQ and need for achievement may have resulted therefrom.

Risk Taking in an Academic Task and in a Game of Chance

The findings of the present study appear to concur with those of Slovic (1962), Cartwright (1968) and Weinstein (1968) in that all reveal that risk taking may not be a general trait, but instead may vary from situation to situation within the same individual. This conclusion is suggested since there was no statistically significant relationship found between risk taking behavior in the academic task and risk taking

behavior in the game of chance.

Sex

Sex and risk taking. No statistically significant correlations were found between sex and risk taking in either the academic task or in the game of chance. This study is in agreement with the results found by Wallach and Kogan (1959, 1961) in their research with adults. The present investigation also concurred with the work of Slovic (1966), who found no sex differences in the risk taking behavior of girls and boys between the ages of six to ten years. As is noted in Chapter II, Slovic's sample may have included only risk takers, since the children in his sample were all taken from volunteers at a county fair. Yet, in the present study one may assume that the sample included risk takers and non-risk takers alike, and, still, here no differences in sex were found.

The present investigation is not in agreement with the work of Kass (1964), who reported that at the ages of six, eight, and ten years, boys took greater risks than girls. The results of this study also conflict with Pankove's finding (1967) that boys are greater risk takers. This may readily be accounted for by the fact that the tasks used here were not sex-oriented; they were not physical tasks involving motor skill, as were those used by Pankove. Thus, the findings of the present study suggest that risk taking may not be predicted on the basis of the sex of the subjects. Both males and females seem to take the same

number of risks in tasks similar to the ones employed in the present investigation.

Sex and divergent thinking. No statistically significant relationships were found between sex and obvious or remote divergent thinking, but there was a statistically significant relationship between sex and flexible divergency ($r = .150$). Females were rated as being the more flexible divergent thinkers. This finding requires further investigation as sex did not correlate with any of the other variables.

CHAPTER VI

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

Summary

The present study investigated the relationship, in fifth grade children, between semantic divergent thinking and different types of risk taking. Also studied was the question of how risk taking was affected by selected variables. Two types of risk taking behavior--academic and game of chance--were examined in relation to three types of semantic divergent thinking, sex, IQ, and need for achievement.

Divergent thinking was measured by three of Guilford's semantic group tests adapted for children: (1) What Would Happen (WWH), (2) Names for Stories (NS), (Merrifield, 1969), and (3) Alternate Uses (AU), (Christensen, Guilford, Merrifield and Wilson, 1960). Obvious divergent thinking was measured by the number of varied responses produced on WWH and NS, while remote divergent thinking was measured by the number of various clever or unique ideas produced on these same measures. Elaborations of obvious answers were grouped together and scored as a single response, and each elaboration of a remote answer was scored as an obvious response. Flexible divergent thinking was measured by the number of different categories encompassed by a

subject's responses on AU.

Risk taking was measured in two situational contexts. Academic risk taking was assessed by the number of guesses taken on nonsense items incorporated within a group vocabulary test. This test was adapted from a similar one used by Martuza (1970) with ninth grade children. Risk taking in a game of chance was measured by the number of times a subject took a chance on giving up a small gain or a small loss for the hope of a greater gain at the risk of a greater loss. The small gain or loss was determined by a card taken from the known deck, and the greater gain or loss was determined by a card taken from the unknown deck. The cards indicated the number of chips won or lost, and the number of chips a subject won would determine the extent of his reward--the number of candy bars received. This game has been employed in previous studies for this purpose (Myers & Sadler, 1960; Katz, 1962; Myers & Katz, 1962; and Rosenfeld, Copeland & Suydam, 1969).

Need for achievement was assessed by objective judgment of four stories written about four pictures taken from the Thematic Apperception Test (McClelland, 1953). Intelligence was measured by the Lorge-Thorndike, Level 3, Form A, Verbal Consumable, group IQ test.

The subjects consisted of pupils enrolled in seven fifth grade classes in a suburban community in Nassau County, New York. Four classes were housed in one school and three in another within this middle-class community. The sample totaled 147 children of which 70

were girls and 77 were boys. The IQ range of the total sample was 84 to 150.

Hypothesis 1 stated that there would be a positive relationship between divergent thinking and risk taking in fifth grade children. It was divided into two sub-hypotheses.

Hypothesis 1a predicted a positive relationship between divergent thinking and risk taking in an academic task. Obvious divergent thinking as measured by NS was, in fact, found to be positively related to risk taking in an academic task. This correlation was statistically significant. However, no other measure of divergent thinking correlated positively with academic risk taking. Flexible and remote divergency, as measured by WWH, were negatively correlated with academic risk taking, while no statistically significant correlation was found between remote divergency, as measured by NS, and academic risk taking. These negative correlations, however, were statistically significant. Thus, Hypothesis 1a was partially upheld.

The relationships, here, between the types of divergent thinking and academic risk taking seem to have been influenced by IQ. As is noted in the previous chapter, since there were such high intercorrelations among the variables of IQ, divergent thinking, and academic risk taking, it is possible that IQ was a confounding factor in those relationships between the types of divergency and academic risk taking. In addition, the relationships of each of the measures of divergent thinking to academic risk taking appear to be associated with the relationships

each have with IQ. Thus, there seems to be a trend here. If the measures of divergency correlate positively with IQ, they tend to correlate negatively with academic risk taking; if they tend to correlate negatively with IQ, they tend to correlate positively with academic risk taking, and, if they have no statistically significant correlation with IQ, they similarly tend to have none with respect to academic risk taking.

Hypothesis 1b predicted a positive relationship between divergent thinking and risk taking in a game of chance. There were no statistically significant correlations found between any of the types of divergent thinking and risk taking in a game of chance. Thus, Hypothesis 1b was not upheld.

Hypothesis 2 stated that there would be a greater positive relationship between divergent thinking and risk taking in a game of chance than in an academic task. However, as no positive relationship was found between divergent thinking and risk taking in a game of chance, Hypothesis 2 could not be substantiated.

This study also investigated the pattern of relationships between risk taking behavior and types of divergent thinking, need for achievement, sex, and IQ as embodied in Sub-problem 3. Stepwise multiple regression equations were calculated to determine the statistical significance of the contributions made by these selected variables to the multiple correlation coefficients when the dependent variables were risk taking in an academic task and in a game of chance. The results of the stepwise analysis in the first equation revealed that IQ

made the greatest contribution to risk taking in an academic task. It accounted for 13 per cent of the variance. After IQ, no other variable made a statistically significant contribution to the multiple correlation coefficients. The second stepwise multiple regression equation, calculated to determine the significance of contributions made by the selected variables upon risk taking in a game of chance, revealed no statistically significant results.

Implications

The findings of the present study add additional support to Guilford's research in that they suggest that divergent thinking is not a unitary ability. Semantic divergent thinking, the subject of the present investigation, has been identified as one of its several dimensions. This dimension has been further segmented into the obvious, remote, and flexible factors. In previous research, when creativity was investigated as a unitary concept, contradictory results were found relating creativity to personality traits, needs, interests, IQ, risk taking, and other variables. The results of the present investigation, however, suggest that meaningful generalizations can probably not be drawn when creativity is treated as if it were one dimensional. Each type of divergent thinker is clearly somewhat unique. Behavioral differences exhibited by them within a given situation suggest that each possess a special and varied makeup incorporating all of the above variables in different degrees. Thus, only through separate examination will true

and accurate pictures of each type of divergent thinker be developed.

Risk taking, by itself, is without doubt, a highly complex behavioral phenomenon. In the present study, two types of risk taking situations were investigated in relation to the variables of IQ, sex, need for achievement, and three types of divergent thinking. Yet, even though these six variables were studied, much of the variances of both types of risk taking were not accounted for herein. This suggests, therefore, that risk taking generally may be so complicated as to require the simultaneous investigation of a large number of variables if most of its variance is to be successfully taken into account. Similarly, the relationship between semantic divergent thinking and risk taking also seems to be highly complex. In addition to the fact that each type of semantic divergent thinking may relate differently to each type of risk taking, many other variables not studied in the present investigation may affect these relationships. Perhaps, for example, an important impact may be produced from personality factors as influenced by certain motivational patterns including fear of failure, history of success and failure, anxiety or defensiveness. Thus, if the true nature of the relationship between semantic divergent thinking and risk taking is to be discovered, it may also require the simultaneous investigation of a large number of variables.

In addition to the above implications which flow directly from the findings of this study, certain other inferences may be made. There is no doubt, for example, that objective tests currently used in the

classroom serve a particular function in that they provide a method for consistent grading. However, as their format is such that they acknowledge the existence of only one right answer to each question, they may tend to discourage divergency. In many schools, furthermore, the use of objective tests is coupled with a heavy emphasis on grade performance. This may create, in turn, a general classroom atmosphere in which the taking of risks by volunteering divergent responses is discouraged. It has been observed in prior studies that different types of tests are needed. Getzels and Jackson (1962) conclude that, if educators want to encourage divergent thinking and discovery, they need to develop tests of an achievement type more appropriate to these outcomes [p. 130]. Similarly, it has been suggested by others that high grades should not be made the focal point of the educational experience. Wallach and Kogan (1965a) felt that teachers should de-emphasize the success-failure aspects of the learning process and encourage children to approach school assignments in a spirit of associative play [p. 323]. Thus, when children are made to feel that more than one answer may be a correct or appropriate response to a particular question, and that grades are not as important as quality of thought, they may be less afraid to use their creative abilities and to take risks within the academic setting.

In the present study, however, those subjects who were high in IQ and in remote or flexible divergent thinking tended to take fewer risks on the academic task. As is explained more fully in Chapter V,

page 55, it is felt that these subjects did not take many risks on the objective test since, being high in IQ, they were reasonably sure of meeting their goal of getting high grades without the need to do so. Thus, as Wallach and Kogan (1965a) have noted, educators seem to be heading in the direction of making the rewards of education ones which are extrinsic to learning for its own sake, i.e., high grades [p. 331]. By minimizing the importance of grades and providing alternatives to testing situations, especially objective types which strongly require conforming behavior, educators may create an atmosphere which will encourage each child to expend his creative energies to the utmost of his ability, and teach him to not be satisfied with merely doing well by externally imposed standards.

Recommendations for Further Research

Creativity does not seem to be a unitary trait, and it should not be studied as if it were. Nor should semantic divergent thinking, a part of creativity, be examined as a composite aptitude. Semantic divergent thinking must be explored in terms of its three different factors: obvious, remote, and flexible. More specifically, these factors should be investigated with respect to their relationships to personality characteristics. Since, in the present study, certain types of divergent thinkers behaved differently with respect to the risk taking tasks, it may be that each possesses different personality characteristics. Merrifield, et al., (1964), using children as subjects, did find that different personality traits were related to each type of divergent thinker. Their

study, however, only represents a beginning. Additional research should be undertaken to further attempt to identify the personality correlates of each type of divergency. Concurrently, it is also suggested that the relationships between the types of semantic divergent thinking and risk taking be examined specifically within the context of different IQ ranges. Differences in personality characteristics have been found with different IQ ranges where creativity was examined as a unitary dimension (Getzels & Jackson, 1962; Wallach & Kogan, 1965a). Thus, it is necessary to conduct additional research in this area in general, and with fifth grade children in particular, if we are to succeed in composing a clear and reliable picture of the personality traits of each type of divergent thinker.

In this study, high intercorrelations were found among remote divergency, IQ, academic risk taking, and flexible divergency. Thus, IQ is believed to be confounding the relationships between remote and flexible divergency, and academic risk taking. In order to diminish this impact of IQ, it is suggested that a replication of the present investigation be undertaken with certain important modifications. Since those subjects high in IQ tend to be better skilled in academic tasks which require verbal fluency, the influence of this skill must be eliminated. Pre-testing of the sample would thus be required in order to determine the level of fluency of each of its subjects. Thereafter, the sophistication of the legitimate items used on the academic risk taking task could be tailored to fit each individual's previously established level

of fluency. Individual skill would, thereby, be controlled as a factor in the risk taking measure.

Further, since IQ correlates highly with semantic divergent thinking measures when a wide range of IQ is employed, it is suggested that future studies focus only on a narrow range of IQ; preferably, the middle or the high one with the lower range eliminated. It seems that a minimum level of IQ is needed to perform adequately on the semantic divergent thinking measures (Torrance, 1960; Getzels & Jackson, 1962; Guilford, 1968). Thus, by employing an average or above-average sample in IQ, all of the subjects would have sufficient ability to perform adequately on these measures. In addition, IQ and creativity have been found to be comparatively independent at the higher levels of intelligence (Getzels & Jackson, 1962).

Since only a small portion of the variance of academic risk taking was accounted for in the present study, and no statistically significant portion of the game of chance, it is suggested that other variables be examined in future studies in addition to those discussed herein. Thus, for example, the motivational patterns of divergent thinkers should also be investigated. Examination of such factors as fear of failure, history of success or failure, anxiety, defensiveness, and the personality traits of each type of divergent thinker within the risk taking situation may be a potentially valuable approach.

More specifically, several modifications in the game used in the present investigation may prove useful in subsequent research.

First, one may undertake to keep a record of what each subject does when a +1 comes up in the known deck, and what is done when a -1 is selected. Such a record would enable the researcher to examine two types of risk taking within the game of chance--one, when a child gives up a small gain, and, the other, when a child gives up a small loss. Previous research has found that subjects do gamble more on a -1 than on a +1 card (Katz, 1962; Myers & Sadler, 1960; Rosenfeld, Copeland & Suydam, 1969). It is suggested then, that those subjects who do gamble when they receive a +1 card may differ in terms of personality than those who gamble only when a -1 card is selected. Further research must be conducted in this area before meaningful implications may be drawn.

Second, one could keep a detailed record of successes or failures prior to each turn of a card from the known deck. This may provide additional information regarding risk taking behavior: Are more risks taken after successes or failures? Separate analyses could be undertaken on these two types of risk taking. Thus, previous successes or failures within the game itself could be examined to determine their effects upon the relationship between divergent thinking and risk taking in a game of chance.

Third, one may refrain from offering candy or any other tangible reward. For many children the "winning" of the game may be sufficient inducement. This approach would be taken so that during the game the child would not be inhibited by proprietary feelings as soon as he became entitled to a candy bar. Also, it may assist in reducing the competitive

factor since the child would not leave the game situation with anything in his hand.

Finally, since positive correlations were found here between IQ and need for achievement and between sex and flexible divergency, it is suggested that further research be conducted to specifically focus upon these relationships in order to clarify our understanding of them.

If followed, the above suggestions may enable further research to shed more light upon the complete relationship between risk taking and divergent thinking. Indeed, almost any contribution to our knowledge in this area would be welcome, as the development of the creative intellect is one of the most important functions of the educational community, and one of its most sorely neglected.

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APPENDIX A

RAW DATA

Subject Number	Sex[4]	IQ	Need for Achievement	Risk Taking in an Academic Task	Risk Taking in a Game of Chance	Obvious Divergent Thinking on NS[5]	Remote Divergent Thinking on NS	Obvious Divergent Thinking on WWH	Remote Divergent Thinking on WWH	Flexible Divergent Thinking on AU
1	1	88	0	3	34	18	8	11	5	13
2	1	114	0	0	15	18	16	14	8	30
3	1	108	+5	4	32	15	19	11	4	25
4	1	118	+4	6	20	24	8	10	12	27
5	1	135	-4	0	24	9	12	5	15	58
6	1	109	-2	3	17	13	17	18	7	25
7	1	107	-1	13	18	23	6	15	6	16
8	1	119	-1	0	24	8	8	10	7	19
9	1	116	+9	0	20	16	4	0	12	32
10	1	117	-2	5	33	5	22	22	14	38
11	1	133	-2	0	18	11	19	8	14	48
12	1	113	0	2	19	6	25	17	11	36
13	1	109	0	2	6	10	26	27	16	37
14	1	119	+8	0	20	4	30	20	2	29
15	1	135	+3	2	22	10	28	20	12	49

[4]1 = female, 0 = male.

[5]Divergent thinking scores are a composite of those recorded by the two raters.

Subject Number	Sex[4]	IQ	Need for Achievement	Risk Taking in an Academic Task	Risk Taking in a Game of Chance	Obvious Divergent Thinking on NS[5]	Remote Divergent Thinking on NS	Obvious Divergent Thinking on WWH	Remote Divergent Thinking on WWH	Flexible Divergent Thinking on AU
16	1	128	+1	0	11	14	22	16	18	49
17	1	138	-1	0	21	10	24	20	15	48
18	1	112	0	9	13	18	14	16	10	35
19	1	107	-1	0	15	10	16	11	7	24
20	1	125	+6	1	18	12	18	13	8	16
21	1	107	+7	1	48	2	16	15	4	33
22	1	130	+4	0	33	8	39	7	19	49
23	1	122	+5	0	32	9	19	18	8	28
24	1	110	+4	7	13	12	26	16	14	24
25	1	147	+4	0	20	3	21	17	18	46
26	1	100	-1	2	33	16	6	15	5	16
27	1	111	-1	3	20	26	27	32	7	25
28	1	130	-1	0	16	5	20	6	12	37
29	1	106	+1	0	27	1	21	12	4	22
30	1	101	+5	1	21	9	14	17	22	16
31	1	119	+1	1	34	8	32	14	7	23
32	1	95	+5	15	27	19	19	15	4	28
33	1	138	-1	0	11	0	14	9	15	24
34	1	130	+2	0	29	20	13	26	16	46

Subject Number	Sex[4]	IQ	Need for Achievement	Risk Taking in an Academic Task	Risk Taking in a Game of Chance	Obvious Divergent Thinking on NS[5]	Remote Divergent Thinking on NS	Obvious Divergent Thinking on WWH	Remote Divergent Thinking on WWH	Flexible Divergent Thinking on AU
35	1	93	-2	4	25	21	5	26	8	13
36	1	109	-2	0	24	13	6	18	14	16
37	1	106	+4	3	14	28	12	33	2	32
38	1	112	+5	7	15	5	15	9	17	24
39	1	115	+2	15	28	44	18	15	8	26
40	1	87	-2	3	16	25	2	8	7	13
41	1	99	+1	0	21	54	6	27	6	15
42	1	118	+1	15	36	65	23	32	6	57
43	1	123	-3	3	20	15	35	16	12	61
44	1	135	0	0	20	10	19	11	8	38
45	1	110	+4	0	16	5	25	16	7	35
46	1	122	+6	3	37	26	14	24	25	51
47	1	129	+3	0	25	11	25	9	13	36
48	1	101	0	1	31	10	10	18	6	20
49	1	106	+2	0	10	25	5	20	6	38
50	1	105	+3	1	45	6	8	7	11	24
51	1	113	+7	15	46	27	18	19	11	13
52	1	150	+3	0	45	4	18	10	8	21
53	1	110	-1	12	23	17	26	19	8	28

Subject Number	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Sex[4]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
IQ	116	102	119	112	109	133	124	144	103	115	85	88	103	119	127	109	89	112	103
Need for Achievement	+1	-1	-4	-1	-1	-4	0	-3	-2	+2	-1	-1	-4	-1	-1	-1	+1	-2	-1
Risk Taking in an Academic Task	2	15	0	2	12	0	0	0	0	0	11	2	0	0	2	0	3	0	10
Risk Taking in a Game of Chance	46	29	10	22	14	21	11	24	7	23	22	22	29	20	25	19	36	23	9
Obvious Divergent Thinking on NS[5]	23	11	9	11	15	1	15	21	24	2	19	21	31	20	33	21	27	6	11
Remote Divergent Thinking on NS	14	13	50	23	19	19	15	21	16	16	14	5	20	10	17	15	6	17	17
Obvious Divergent Thinking on WWH	15	9	26	11	18	17	18	14	16	17	16	15	5	22	24	15	16	11	16
Remote Divergent Thinking on WWH	6	6	23	7	7	4	11	31	6	13	6	13	7	8	8	17	17	8	17
Flexible Divergent Thinking on AU	34	16	77	21	14	32	27	52	20	35	15	16	42	20	37	16	42	29	26

Subject Number	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Sex[4]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IQ	102	90	126	143	130	119	106	85	102	130	115	87	110	138	132	130	85	121	112
Need for Achievement	-1	-2	-3	-1	-1	+5	+5	-2	+11	-2	+3	-4	-1	-4	+6	0	-1	0	0
Risk Taking in an Academic Task	1	6	2	0	0	4	1	12	3	2	0	12	0	2	0	0	15	0	15
Risk Taking in a Game of Chance	36	24	38	29	30	22	27	24	23	25	49	23	10	26	17	36	44	21	33
Obvious Divergent Thinking on NS[5]	35	6	8	6	10	7	42	20	28	40	30	13	41	23	13	9	11	0	17
Remote Divergent Thinking on NS	23	10	18	32	18	9	12	4	2	21	16	10	48	28	11	21	5	16	7
Obvious Divergent Thinking on WWH	18	2	14	3	10	9	8	19	6	3	13	10	13	11	13	17	11	6	7
Remote Divergent Thinking on WWH	10	10	6	15	2	6	2	3	4	2	18	9	7	12	13	11	4	15	1
Flexible Divergent Thinking on AU	52	27	33	54	34	22	21	7	8	48	38	30	42	37	37	22	14	41	8

Subject Number	Sex[4]	IQ	Need for Achievement	Risk Taking in an Academic Task	Risk Taking in a Game of Chance	Obvious Divergent Thinking on NS[5]	Remote Divergent Thinking on NS	Obvious Divergent Thinking on WWH	Remote Divergent Thinking on WWH	Flexible Divergent Thinking on AU
92	0	116	+2	0	29	20	40	13	20	26
93	0	131	0	0	25	14	30	26	21	76
94	0	140	+6	15	19	9	45	29	12	29
95	0	143	+4	0	30	8	34	14	20	53
96	0	105	0	0	15	8	30	13	14	39
97	0	146	+7	0	22	2	28	26	17	26
98	0	140	+6	0	16	1	22	14	11	40
99	0	116	+12	2	26	8	54	15	6	30
100	0	123	0	13	28	5	35	25	27	53
101	0	113	-1	3	24	4	39	24	20	46
102	0	116	0	5	31	17	9	14	5	10
103	0	108	0	0	20	7	15	12	6	36
104	0	99	+3	14	16	8	7	9	7	28
105	0	100	-1	4	17	2	7	10	8	14
106	0	99	-2	5	22	12	8	24	6	22
107	0	98	0	0	25	12	2	10	7	16
108	0	117	-1	0	31	5	9	12	4	7
109	0	123	0	0	32	25	11	18	32	30
110	0	122	+4	0	30	37	3	19	16	24

Subject Number	Sex[4]	IQ	Need for Achievement	Risk Taking in an Academic Task	Risk Taking in a Game of Chance	Obvious Divergent Thinking on NS[5]	Remote Divergent Thinking on NS	Obvious Divergent Thinking on WWH	Remote Divergent Thinking on WWH	Flexible Divergent Thinking on AU
111	0	110	0	0	30	17	5	24	18	10
112	0	109	+16	6	29	14	6	15	18	28
113	0	93	0	1	37	8	6	12	8	17
114	0	102	0	0	27	16	3	19	6	10
115	0	133	-1	0	25	31	1	25	12	14
116	0	95	0	0	32	2	12	2	10	20
117	0	130	+6	0	31	3	17	7	13	33
118	0	90	0	1	21	7	5	14	2	32
119	0	95	+1	1	17	14	12	10	3	8
120	0	91	-1	7	20	39	12	17	3	4
121	0	124	0	0	25	10	13	11	11	25
122	0	117	+7	0	31	26	11	15	7	35
123	0	99	+4	15	24	9	13	8	10	22
124	0	91	0	14	22	20	9	7	2	4
125	0	100	-2	15	24	11	15	10	5	16
126	0	115	+4	0	24	15	24	15	10	58
127	0	105	-2	0	22	7	5	12	0	5
128	0	115	+2	0	17	22	40	21	30	31
129	0	122	0	1	22	9	15	23	27	32

Subject Number	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147
Sex[4]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IQ	116	103	113	110	112	102	135	105	89	97	100	91	106	103	90	98	113	84
Need for Achievement	-2	-4	-3	-1	-2	-1	+1	-1	0	0	-3	-3	+1	0	-2	-1	-2	-1
Risk Taking in an Academic Task	12	0	0	5	4	3	0	1	2	2	3	0	1	7	11	2	0	13
Risk Taking in a Game of Chance	19	11	22	26	38	22	33	25	25	30	16	32	26	18	35	22	41	23
Obvious Divergent Thinking on NS[5]	19	17	19	7	16	3	8	10	6	31	20	10	40	5	42	25	31	20
Remote Divergent Thinking on NS	24	14	17	23	35	7	24	6	16	6	9	9	16	13	21	9	3	5
Obvious Divergent Thinking on WWH	30	21	18	8	20	6	9	18	14	8	21	11	29	12	23	8	22	4
Remote Divergent Thinking on WWH	19	8	10	15	6	6	5	3	14	2	3	13	28	7	9	18	7	12
Flexible Divergent Thinking on AU	44	16	17	21	22	19	27	12	18	35	15	20	37	16	45	10	37	8

APPENDIX B

MEANS AND STANDARD DEVIATIONS

MEANS AND STANDARD DEVIATIONS

Variable	Means	Standard Deviation
Sex	.4762	.5011
IQ	112.7347	15.2573
Need for Achievement	.8163	3.3861
Risk Taking in an Academic Task	3.2925	4.8004
Risk Taking in a Game of Chance	24.5714	8.5712
Obvious Divergent Thinking on NS	15.5238	11.2696
Remote Divergent Thinking on NS	16.6054	10.5756
Obvious Divergent Thinking on WWH	15.1360	6.8152
Remote Divergent Thinking on WWH	10.3741	6.4862
Flexible Divergent Thinking on AU	28.7619	14.2988